

The mechanisms of water are unbearably complex. A tension is created between the resistance of stone and the erosional power of water. This shape that remains – a long, narrow mansion full of dark walkways and parlors – is a geomorphological search for resolution. I am here seeking resolution as well. I struggle to find a balance between darkness and hope...

It is hard to make sense of it because I live in a human world where things are labeled either good or bad. That this canyon and its floods are neither does not sit well with this way of thinking.

The Desert Cries – A Season of Flash Flood in a Dry Land
(p. 95) / Craig Childs



Dan McGregor, County Hydrogeologist
Bernalillo County Public Works
8/22/07 EMA Coalitions Meeting

http://www.valerieandjoe.com/archives2/CRW_7485_L16_A_A2_200.jpg

Water In the East Mountains?



Dan McGregor & Kurt McCoy
Bernalillo County Hydrologist USGS Hydrologist



present

- Bernalillo Groundwater Monitoring Report
- USGS report of Groundwater Resources in the East Mountain Area

4:00pm Saturday Feb. 28, 2009
Vista Grande Community Center

Sponsored by the North 14 Coalition



Dan McGregor, County Hydrogeologist
Bernalillo County Public Works
8/22/07 EMA Coalitions Meeting

Originally Presented to:
EMA Neighborhood Coalition
August 22, 2007

Existing County Programs

- **USGS East Mountain Program**

(\$100 K / 50 percent Share)

- Precipitation Stations (8)/ Surface Flow Monitoring (3 stations)
- Water Level Monitoring Program (23 wells)
- Spring Chloride / Isotope Monitoring (5 sites)
- Interpretive Reports / Peer Review
- Possible Additional Programs
 - Wastewater System Recharge
 - Quantitative Recharge Evaluation

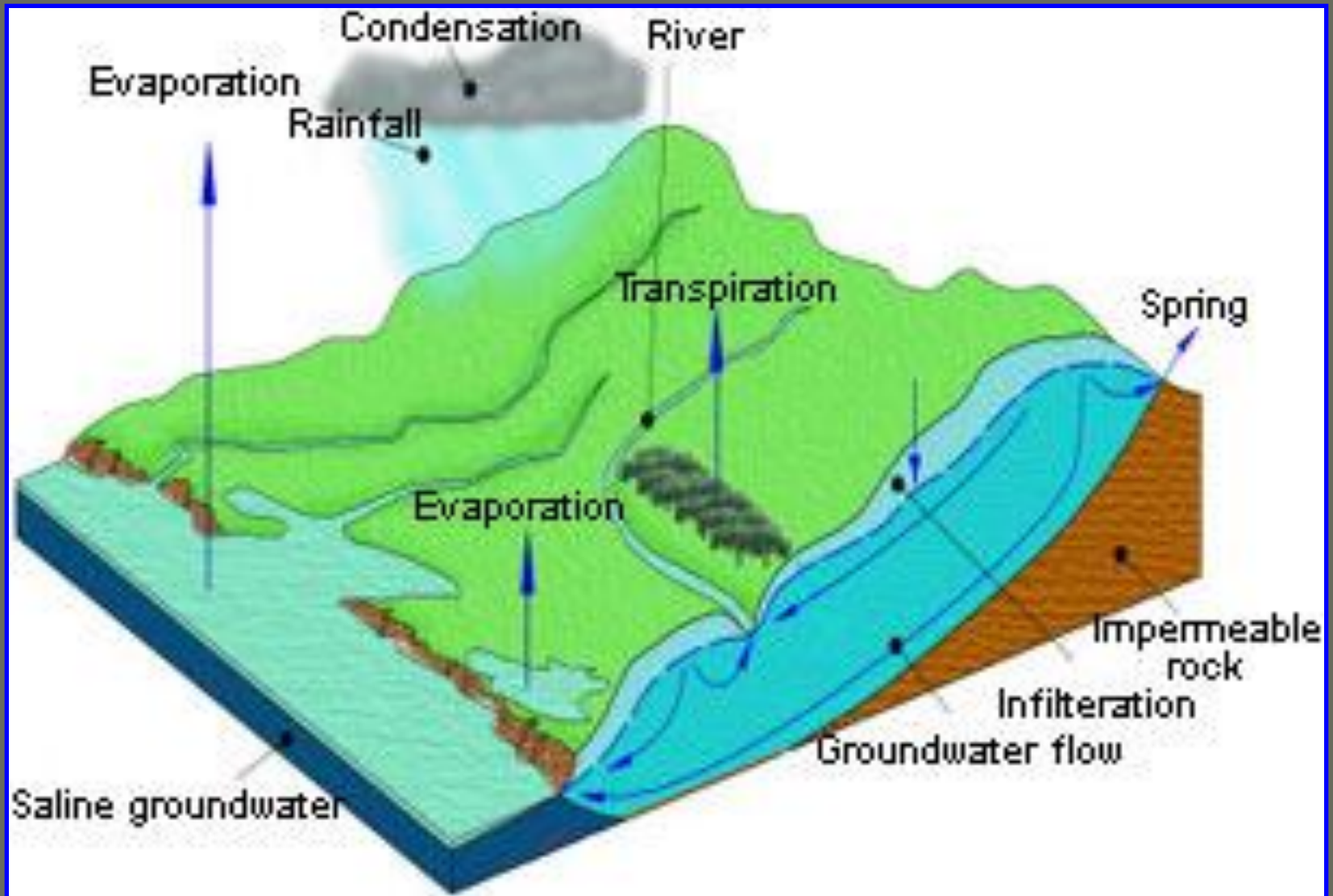


Existing County Programs

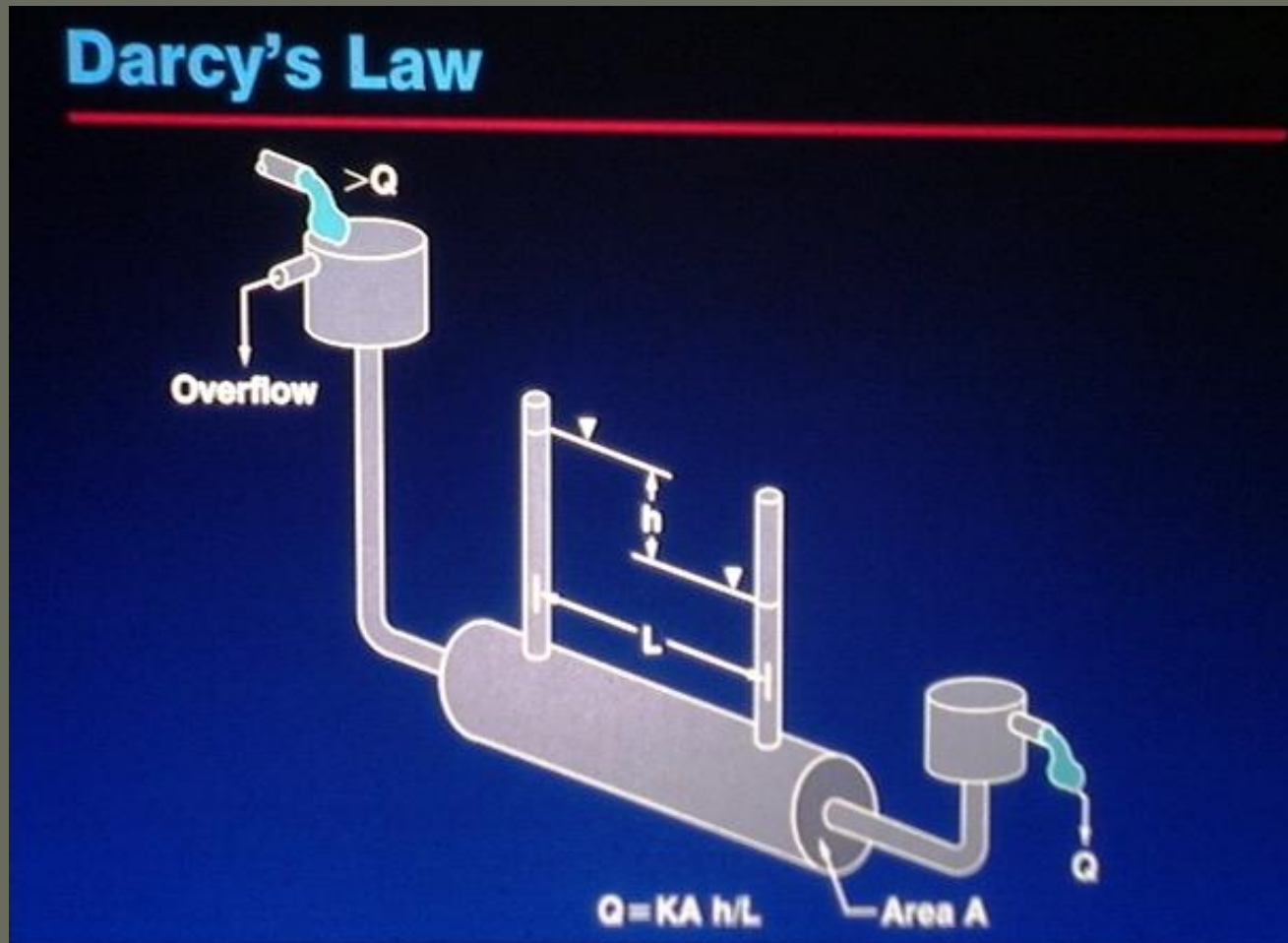
- **Bernalillo County Groundwater Monitoring Program**
 - Annual Sampling (18 monitoring wells plus County facilities)
 - Water Level Monitoring (36 Locations County Wide)
 - Monitoring Well Acquisition / Drilling (2 wells, 4 possible sites)
 - Spring flow monitoring (County Open Space at Carlito and Ojito)
 - Landfill Sampling
 - Bernalillo County Regional Groundwater Sampling Report
- **Ad hoc committees / Planning**
 - OSE / Entramosa Hydrologic Committee
 - East Mountain Area Plan / West Tijeras Plan / Public Outreach
 - Regulatory, Ordinance, Criteria Reviews
- **Estancia Basin Water Planning Committee**
- **ISC Regional Water Planning Advisory Council**
- **Subdivision Review / Water Conservation Ordinance**



Classic Hydrologic Cycle

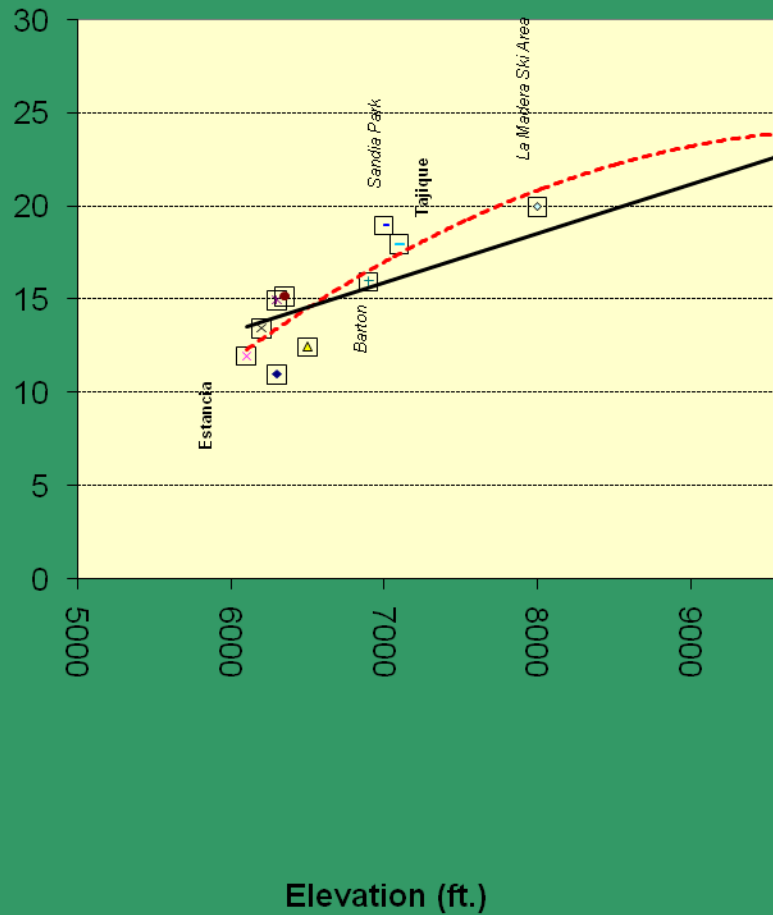


Groundwater Flow - Basics



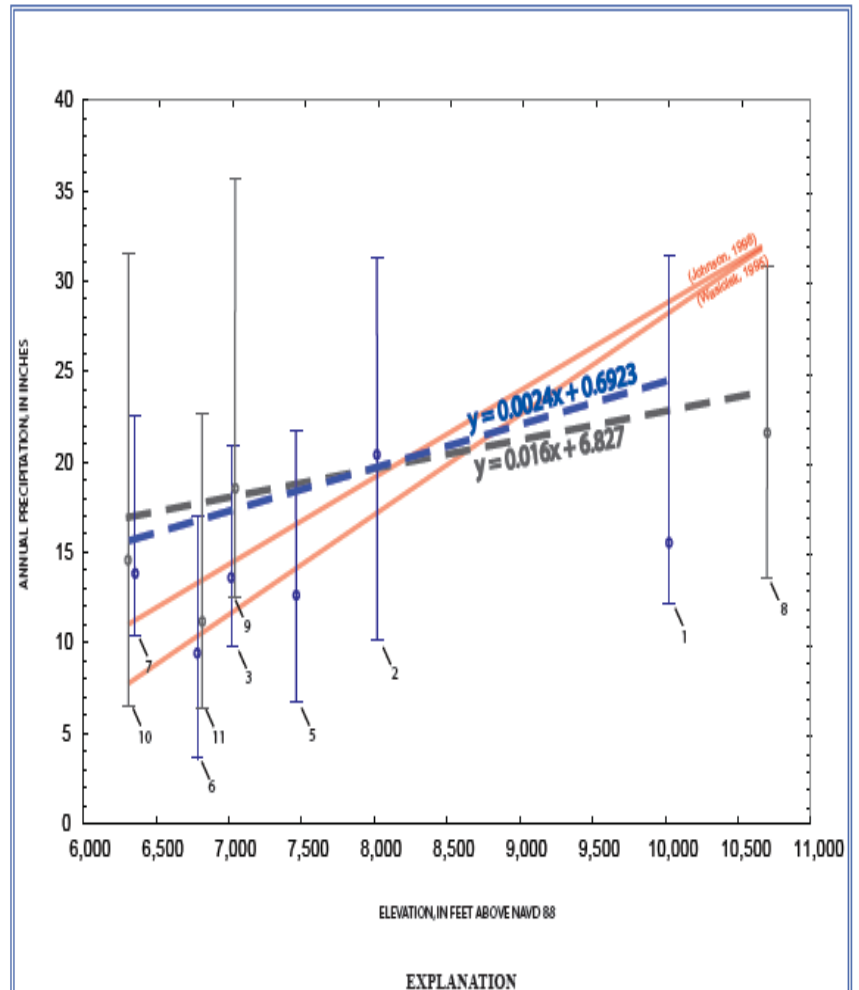
Change in Precipitation with Elevation

Average Annual Precipitation (in/yr)



Elevation (ft.)

10 Precipitation, Ground-water Hydrology, and Recharge Along the Eastern Slopes of the Sandia Mountains



WATER BUDGET

15% RUNOFF

80% EVAPORATION

5% RECHARGE

(VARIABLE)

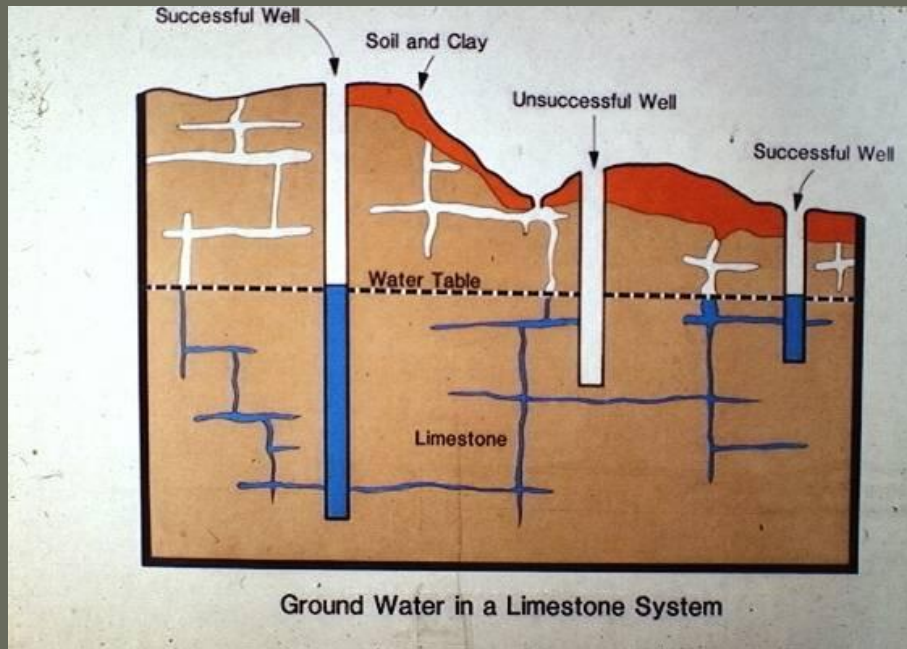


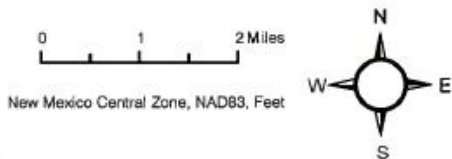
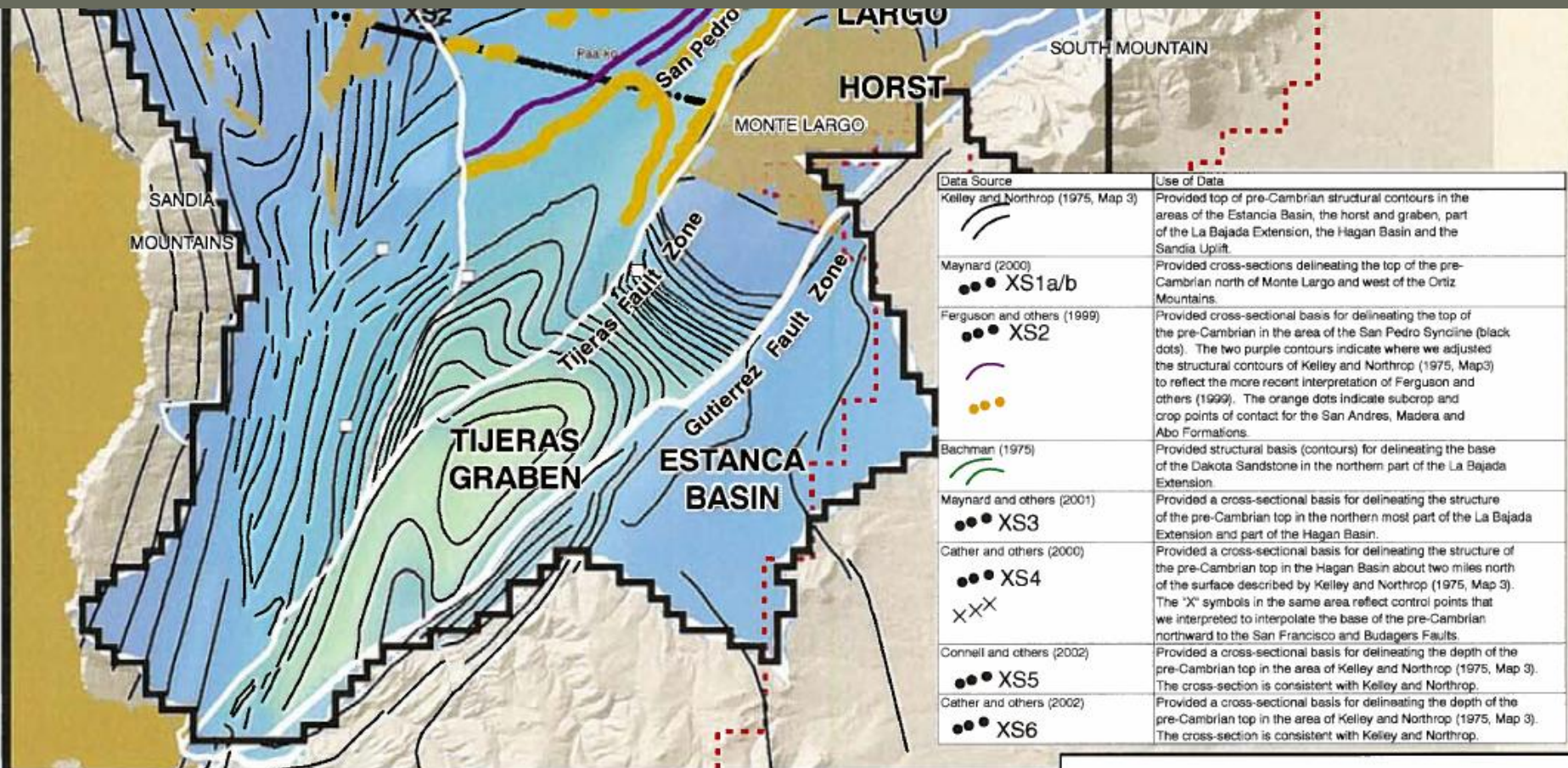
Evapotranspiration



<http://www.cabq.gov/openspace/images/bosquethumb.jpg>

Geologic Complexities





OFFICE MODELS / SANDIAHAGAN 07

GEOLOGIC STRUCTURE OF MODEL AREA AND DATA SOURCES

FIGURE 2

DATE:
7/26/2006
PRODUCED BY:
SES
CHECKED BY:
WPF/DOR
FILE NAME:
Brg2.MXD



RAILROADS/BOUNDARY, INC.



Dan McGregor, County Hydrogeologist
Bernalillo County Public Works
8/22/07 EMA Coalitions Meeting

EMA ANNUAL RECHARGE ESTIMATES

Area	Annual Precipitation (acre - feet)	Recharge		
		3 percent	7.5 percent	15 percent
West Facing Slopes of the Sandias	14,200	426	1,065	2,130
West Facing Slopes of the Manzanos	60,700	1,821	4,553	9,105
<i>Estancia Basin Portion of EMA</i>	<i>88,800</i>	<i>2,664</i>	<i>6,660</i>	<i>13,320</i>
<i>Tijeras Canyon</i>	<i>64,200</i>	<i>1,926</i>	<i>4,815</i>	<i>9,630</i>
<i>San Pedro Creek</i>	<i>44,700</i>	<i>1,341</i>	<i>3,353</i>	<i>6,705</i>
Total for EMA Area	197,700	5,931	14,828	29,655



EMA ESTIMATED RECHARGE

Table 5. Median, minimum, maximum, and range of percent recharge at selected springs estimated by using the chloride mass balance technique.

[Site locations shown in fig. 1. Abbreviations: mg/L, milligram per liter; in, inches]

Site number	Spring name	Number of samples	Chloride concentration (mg/L)			Estimated annual recharge (in)			Percent recharge range (percent)
			Median	Minimum	Maximum	Median	Minimum	Maximum	
45	Wolf	11	32.6	4.33	41.5	0.2	0.2	1.5	0.70 - 6.9
46	Carlito	13	1.69	1.61	1.94	3.9	3.4	4.1	15 - 19
47	Canoncito	11	1.59	1.31	1.73	4.2	3.8	5.0	17 - 23
48	Cole	11	2.07	1.88	2.29	3.2	2.9	3.5	13 - 16
49	Cienega	12	15.9	2.43	20.7	0.4	0.3	2.7	1.4 - 12

Scientific Investigations Report 2008–5179



EMA ANNUAL RECHARGE ESTIMATES

- 37,400 af (Maxey-Eakin / entire area/ EMA Plan)
- 29,655 af (15 percent assumed, no west slopes)
- 9,788 af (Elev. Adj. / no west slope / EMA Plan)
- 5,931 af (3 percent assumed, no west slopes)
- **Average Value: 20,932 acre-feet.**



ESTIMATED EMA ANNUAL USE (ac-ft)

Recharge: 10,000 ac-ft (approximate)

Spring Flows (Best Guess) ? 851 ?

EMA Utility System Usage

NE Small Systems (30): < 249 >

SE Small Systems (9) < 62 >

Entranosa (existing pumpage) < 1,200 >

Entranosa (outstanding commitments) < 1,000 >

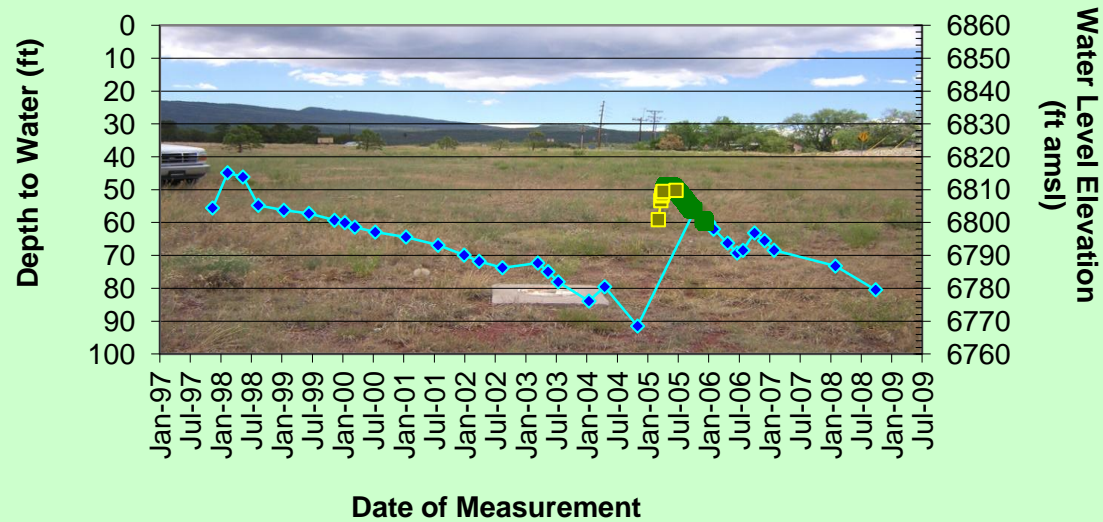
Domestic Wells

NE and SE (4,300 x 0.3) < 1,290 >

Balance 5,350 (rough guess maximum)



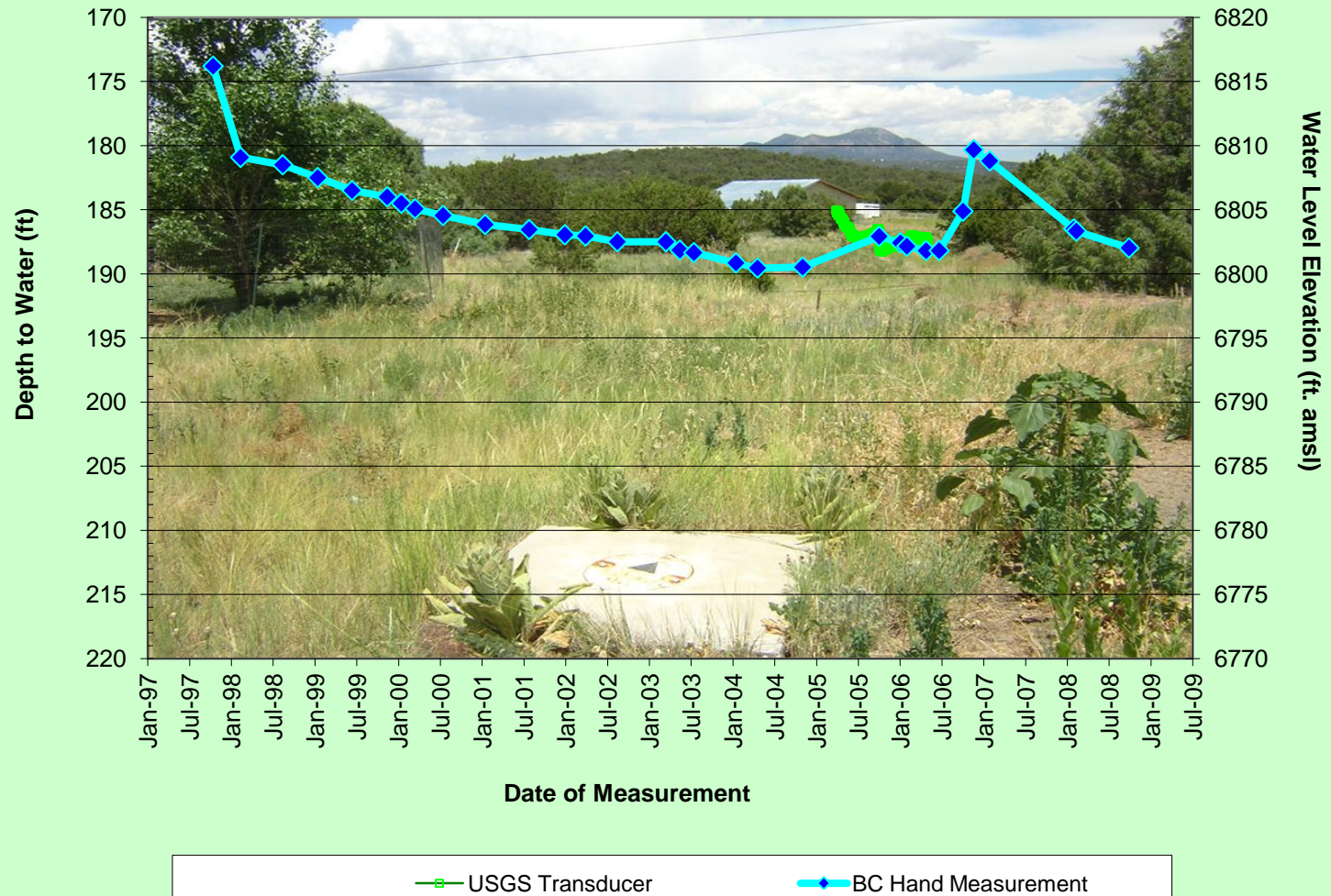
Water Levels in Sandia Park Well 1



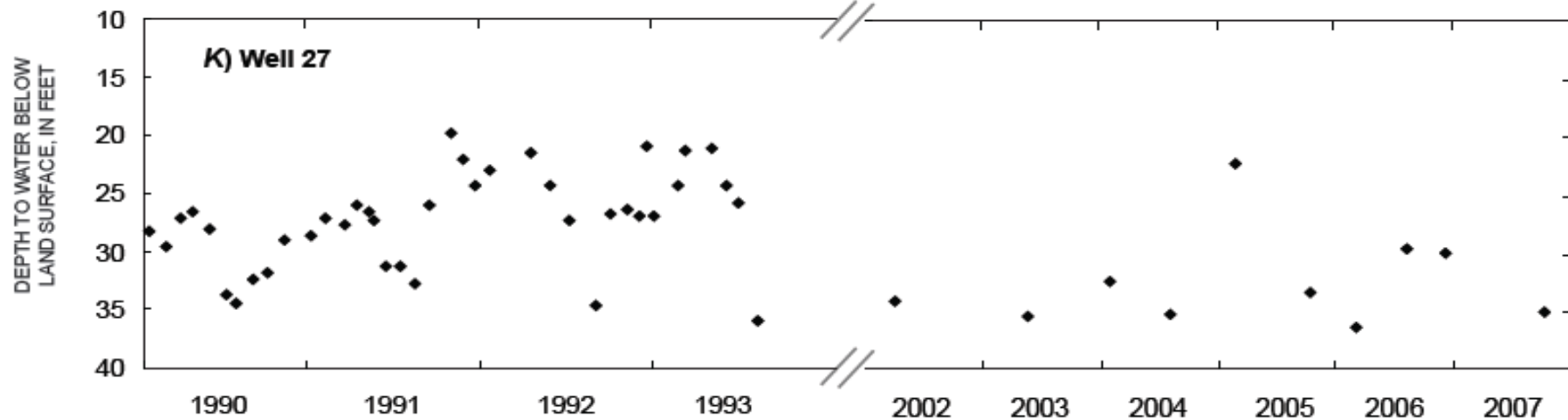
BC Hand Measurements USGS Transducer Data USGS Hand Measurements

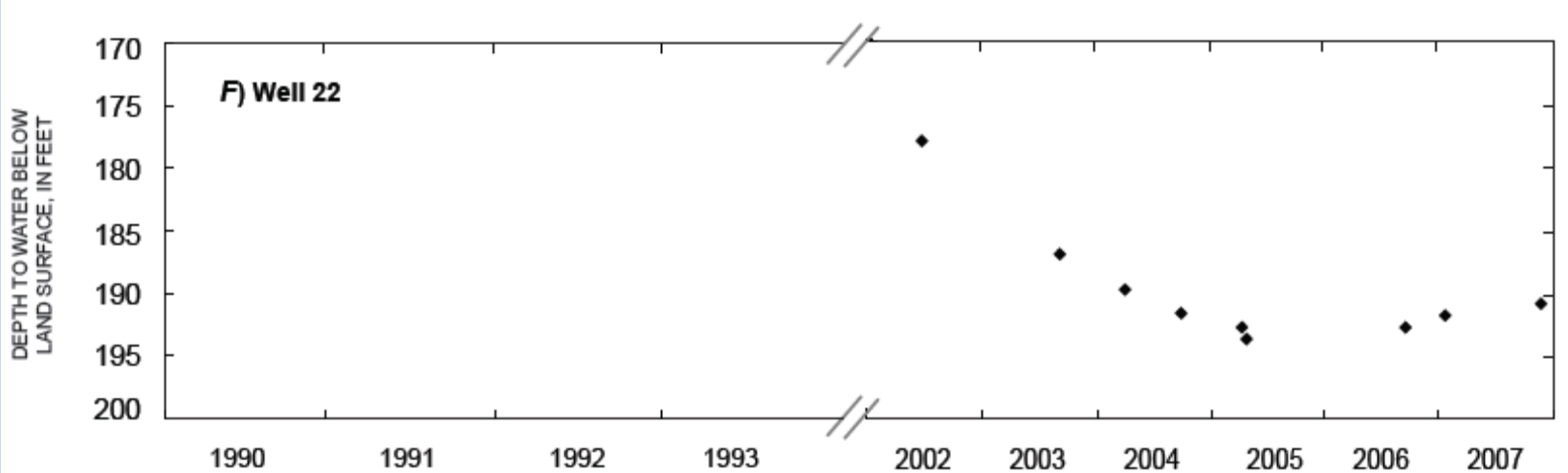
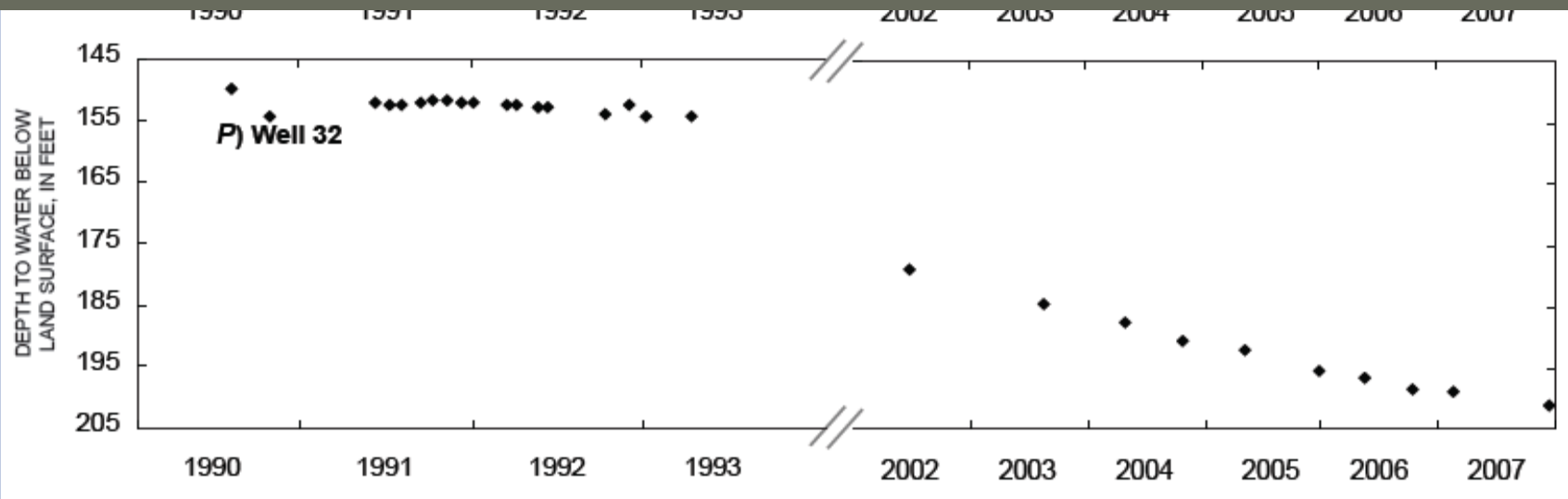


Water Levels in Pinon Ridge Well 1

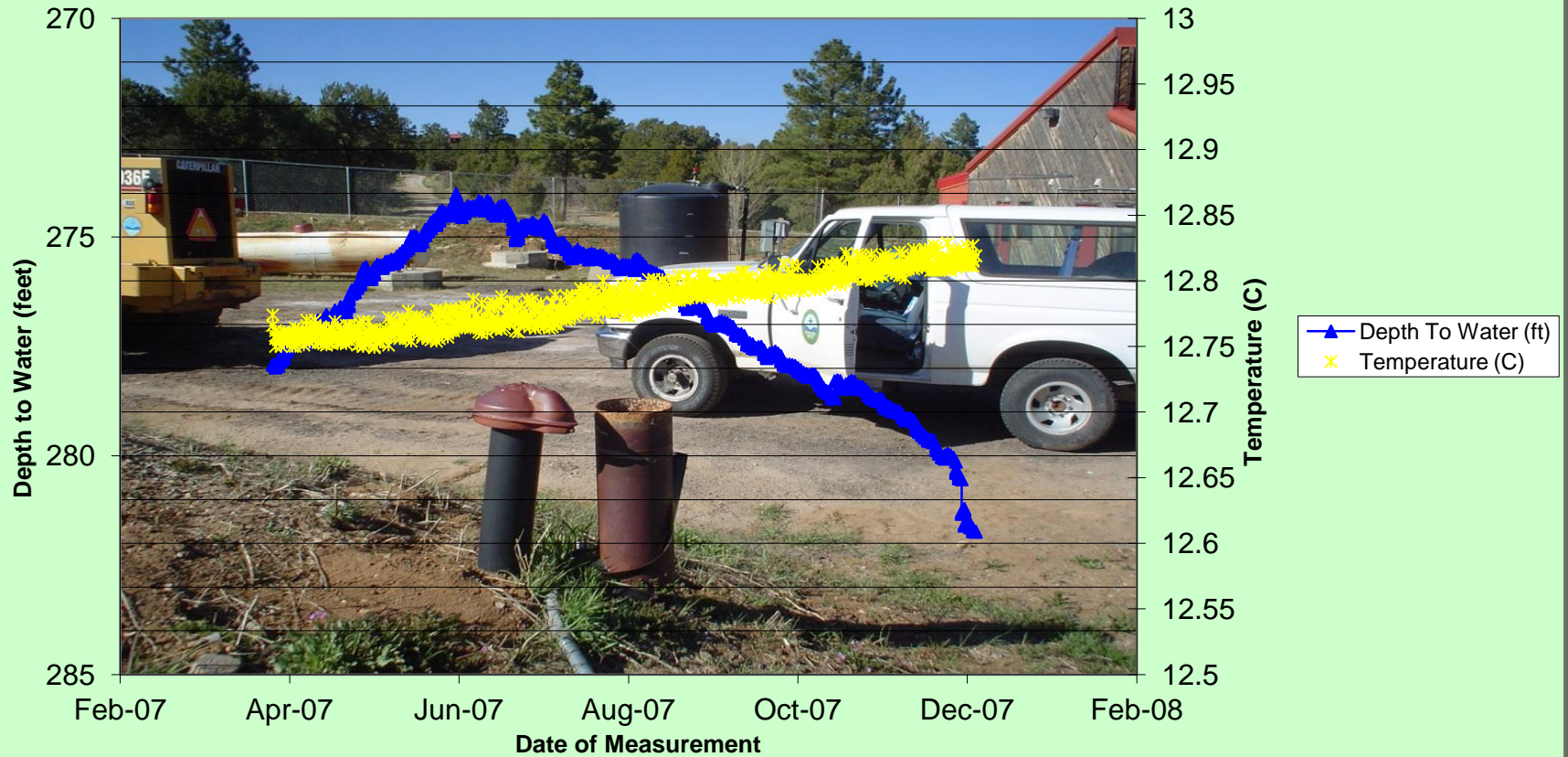


Depth to Water and Temperature at EMA Transfer Station

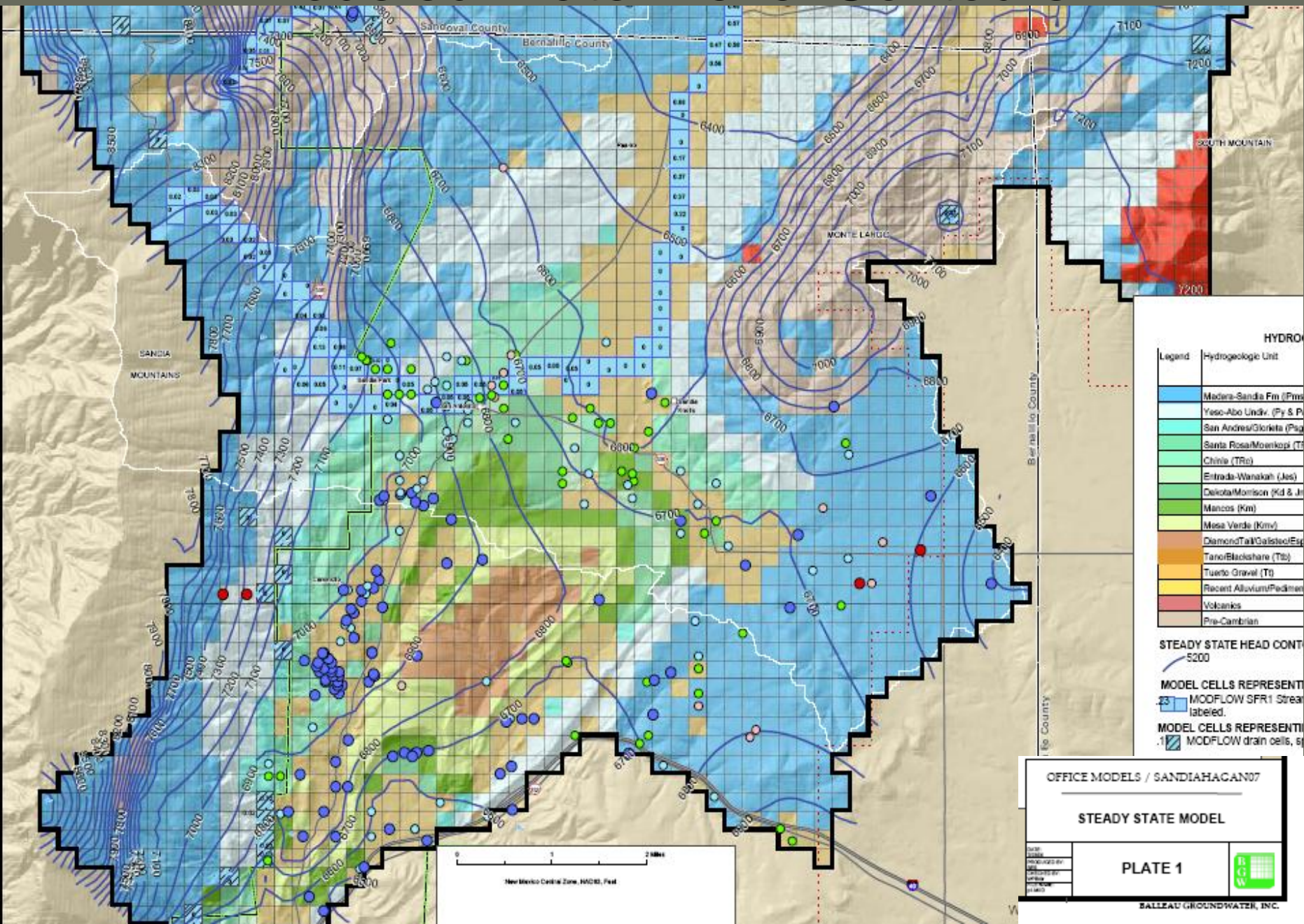




Depth to Water and Temperature at FS #11



Modeled Water Level Contours

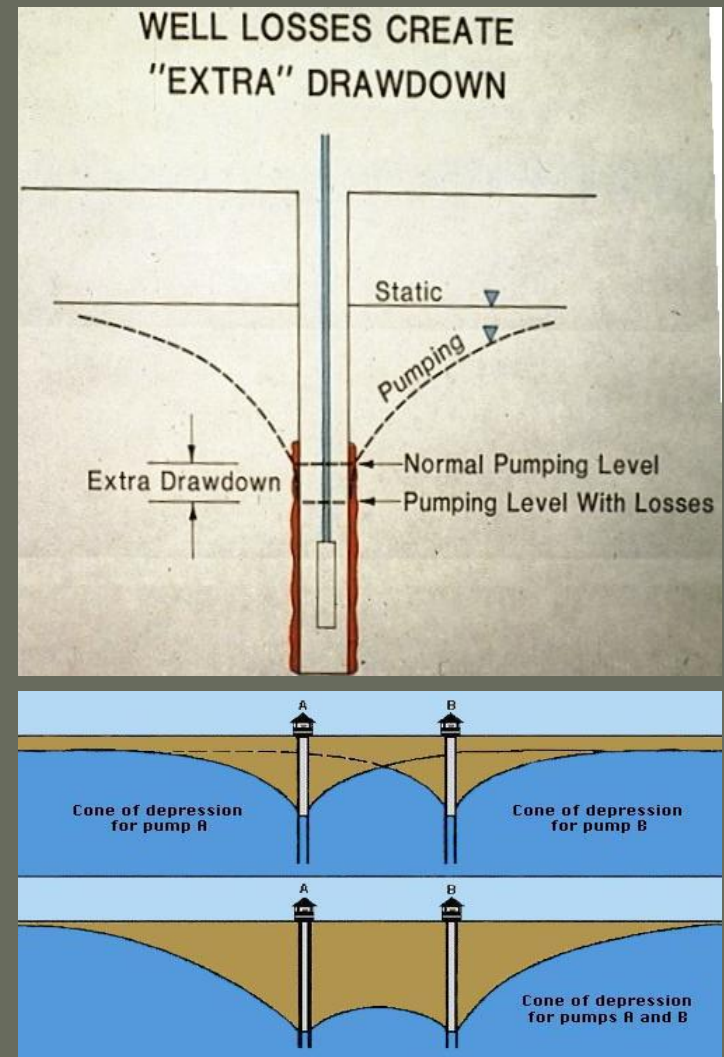
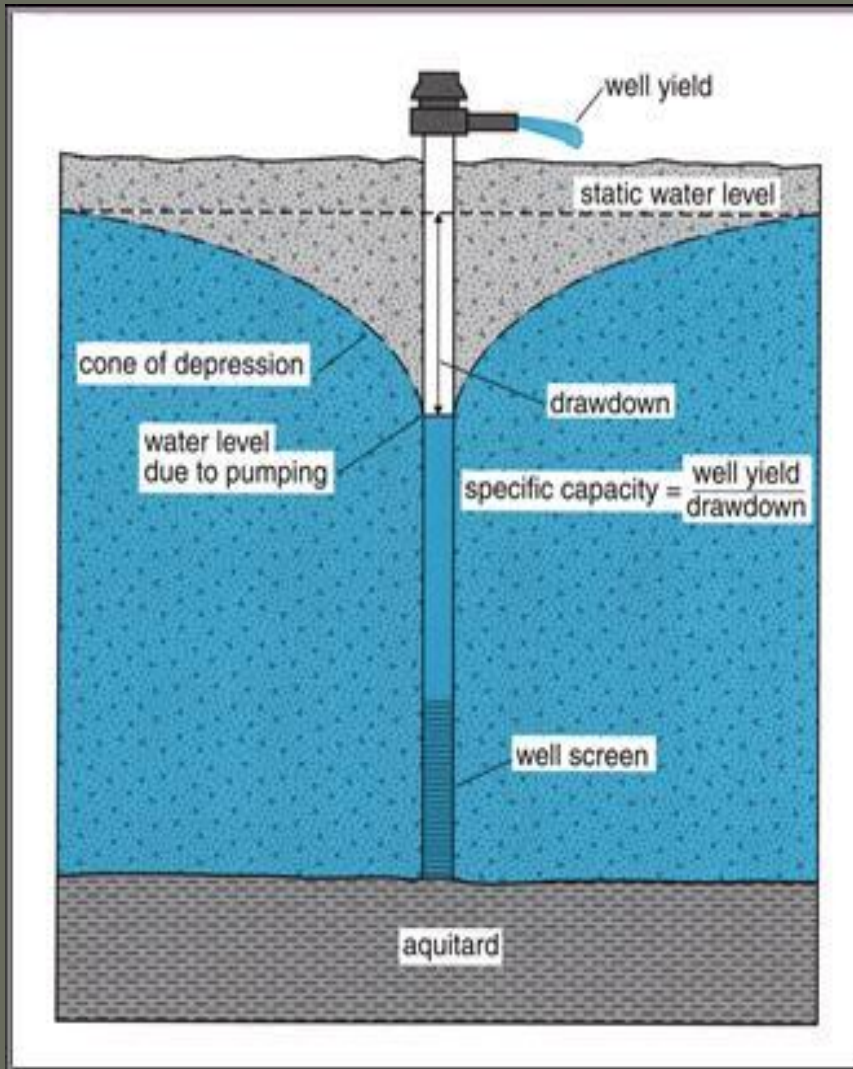


But my well?

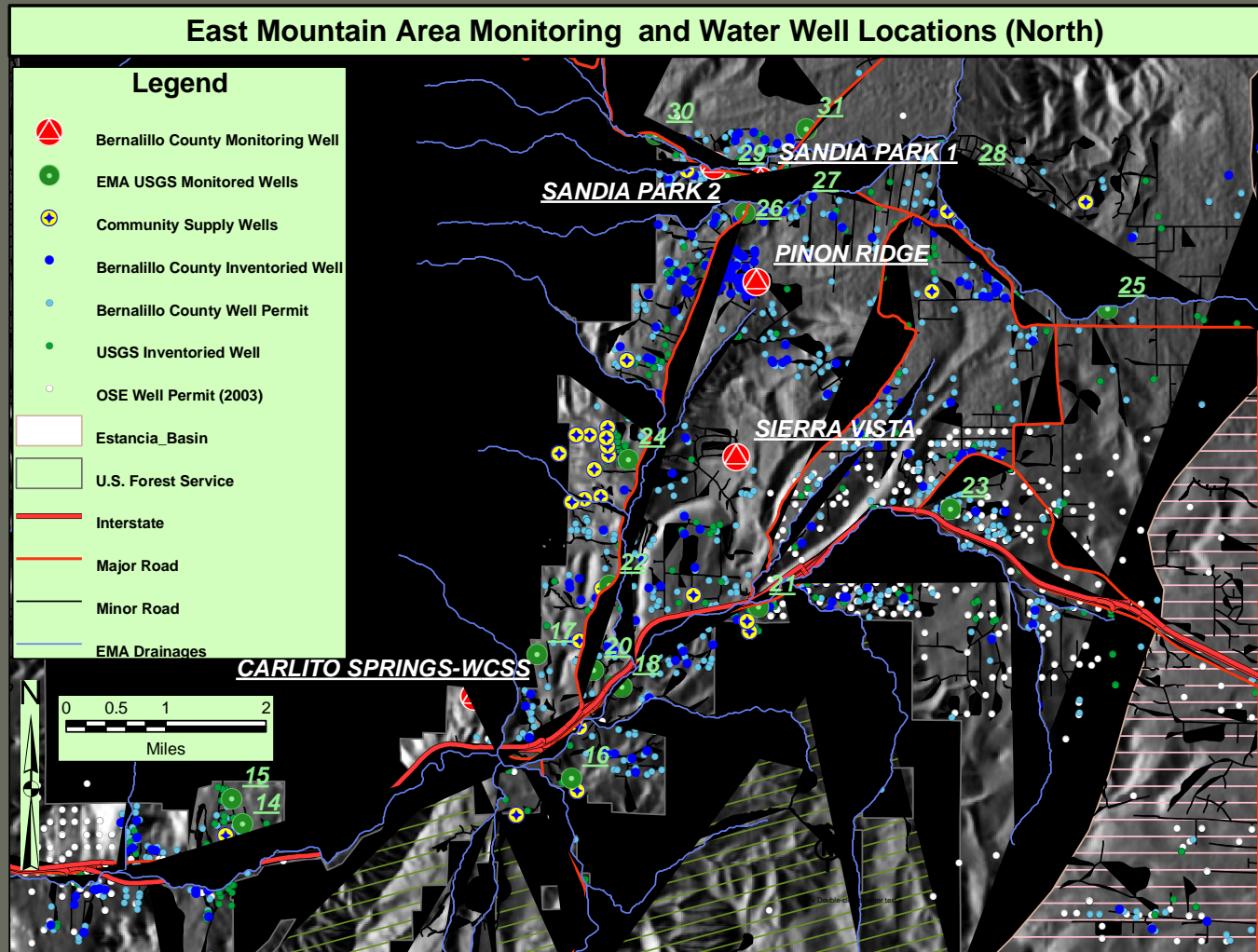
- Was fine until ... (casuality vs. cause)
- Makes “x” gpm (rate vs capacity)
- Is ___, but my neighbor’s is ____



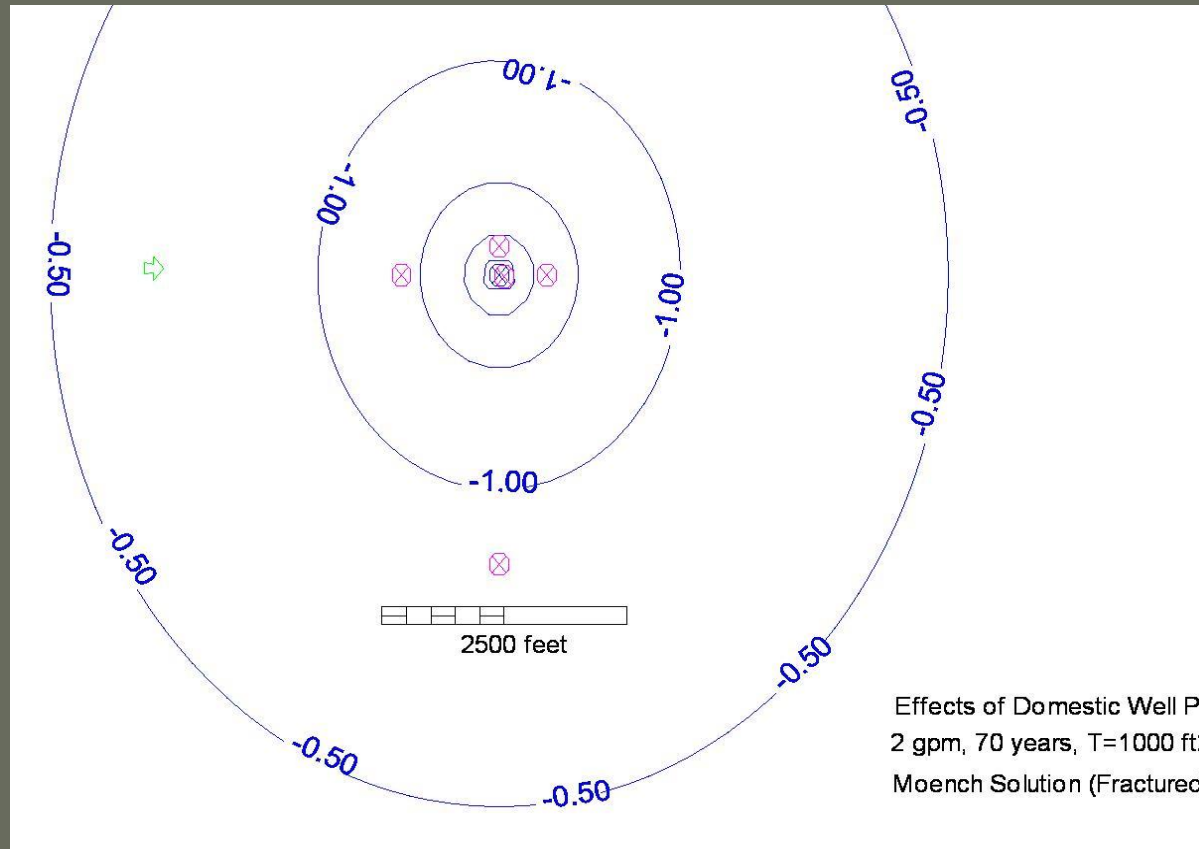
Individual Well Hydraulics



Well Densities



Effect of Domestic Well Pumping



Considerations During Construction

- Well Hydraulics / Pump and Well Maintenance Problems
- Localized Pumping / Well Density
- Geologic Complexities
- Effects of Drought
- Regional Water Level Trends



So What Can I Do?

- **Conserve**, Conserve, **Conserve**
- Keep your well and septic tank in good operating conditions
- Practice Green (Energy = Water)
- Know about your well – water levels, depth, capacity
- Be Active in Community Planning



Bernalillo County Contacts

- Bernalillo County Public Works **848-1500**
 - Program Manager: Mary Murnane
 - Water Resources: Dan McGregor
 - Water Conservation: Kerry Bassore
- Water Waste Hotline **224-2100**
- Bernalillo County Env. Health **314-0310**





Dan McGregor, County Hydrogeologist
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Existing County Ordinance – Minor Subdivisions, Sec 74-97

Handled through BCEH Review

- One well log from within one mile in representative geologic conditions
- Statement of “estimated yield in gpm”
- “Where certain geologic conditions exist...”
- No requirements for
 - Impact on neighboring wells
 - No minimum spacing requirements
 - “First in time” rights protection (misconception)
 - Detailed hydrogeologic reports



Existing County Ordinance – **Major Subdivisions, Sec 74-96**

Handled through BCPW Review

- Community Supply (20 lots or more)**
 - Letter of Availability
 - Name of Utility
 - “Ready, willing, and able to provide 0.6 ac-ft per lot”
 - “At the discretion of the County”
- Individual or Shared Well Supplies**
 - Hydrogeologic Report
 - » 70 years supply, as designed or proposed
 - » Exploratory Wells
 - » Impact to others – go dry, 50 percent, average decline of 1 foot per year or more
 - » Lowest Practical Pumping Level
- Proof of valid water right for Final Plat Approval**

